

WHAT IS CLAIMED IS:

1. A method for underground drilling, the method comprising:
 - 5 a) generating high intensity pressure pulses at the surface of an area to be drilled;
 - b) coupling the high intensity pressure pulses into drilling mud being pumped into a drill string;
 - 10 c) allowing the high intensity pressure pulses to propagate down the drill string to an underground location; and,
 - d) allowing the high intensity pressure pulses to do work at the underground
- 15
2. The method of claim 1 wherein the work comprises causing a flow of drilling fluid through nozzles in a drill bit at the bottom of the drill string to fluctuate.
- 20
3. The method of claim 1 wherein the work comprises operating a down hole tool.
- 25 4. The method of claim 3 wherein operating the downhole tool comprises forcing a portion of the drill string which includes the drill bit suddenly downwardly.
- 30 5. The method of claim 4 wherein generating the high intensity pressure pulses comprises causing drilling mud to flow in a conduit and

suddenly and periodically interrupting the flow of drilling mud in the conduit.

6. The method of claim 3 wherein operating the
5 downhole tool comprises lifting a portion of the drill string which includes the drill bit upwardly and compressing a spring.
7. The method of claim 6 wherein generating the
10 high intensity pressure pulses comprises causing drilling mud to flow in a conduit and suddenly and periodically interrupting the flow of drilling mud in the conduit.
- 15 8. The method of claim 1 wherein generating the high intensity pressure pulses comprises causing drilling mud to flow in a conduit and suddenly and periodically interrupting the flow of drilling mud in the conduit.
- 20 9. The method of claim 8 wherein causing drilling mud to flow in a conduit comprises diverting a portion of a main flow of drilling mud from a mud pump to the drill string into the conduit.
- 25 10. The method of claim 9 comprising returning mud which has flowed through the conduit to a mud tank.
- 30 11. The method of claim 9 comprising providing a point at which a hydrostatic pressure of drilling mud flowing toward a drill string in

a main conduit is reduced and introducing mud which has flowed through the conduit into the main conduit at the point of reduced pressure pressure.

5

12. The method of claim 11 wherein providing a point at which a hydrostatic pressure of drilling mud flowing toward a drill string in a main conduit is reduced comprises providing 10 a jet pump and causing drilling mud flowing in the main conduit to pass through the jet pump.
13. The method of claim 1 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped 15 into a drill string is performed upstream from the flexible hose.
14. The method of claim 4 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped 20 into a drill string is performed upstream from the flexible hose.

25
30

15. The method of claim 6 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed upstream from the flexible hose.
- 10 16. The method of claim 1 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.
- 20 17. The method of claim 4 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.
- 30 18. The method of claim 6 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity

pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.

5 19. Underground drilling apparatus comprising:

- a) a drill string;
- b) a mud pump;
- c) a main conduit carrying mud pumped by the mud pump toward the drill string;
- 10 d) pulse generator means located at the surface for generating high intensity pressure pulses;
- e) pulse transmission means for coupling high intensity pressure pulses generated by the pulse generator means into mud being pumped toward the drill string.

15